

# Lithium-ion (Li-ion) Battery Packs: Important Information

## Safety Guidelines

Follow the instructions in this document carefully for your own safety, the safety of others, and to maximize battery life and performance.

### **⚠ WARNING!**

- Do not use the Battery Pack if the Battery Pack casing is broken or if a Battery Pack emits an unusual odor, smoke, or excessive heat or leaks any substance. Avoid contact with any substance seeping from the Battery Pack.
- Keep out of reach of children and pets. Exposure to Battery Pack voltage could result in death or serious injury.
- Unplug or disconnect your Segway Personal Transporter (Segway PT) from AC power before removing or installing Battery Packs or performing any service. Never work on any part of your Segway PT when it is plugged into AC power. You risk serious bodily injury from electric shock as well as damage to your Segway PT.
- The cells within the Battery Packs contain toxic substances. Do not attempt to open Battery Packs. Do not insert any object into the Battery Packs or use any device to pry at the Battery Pack casing. If you insert an object into any of the Battery Packs' ports or openings you could suffer electric shock, injury, burns, or cause a fire. Attempting to open the Battery Pack casing will damage the casing and could release toxic and harmful substances, and will render the pack unusable.
- Observe and follow all safety information on the warning label found on the Battery Packs.
- Failure to charge the Battery Packs could result in permanent damage to them. Left unplugged, the Battery Packs could fully discharge over time, causing permanent damage.
- Use only charging devices approved by Segway and never attempt to bypass or override their charging protection circuits.
- Do not submerge the Battery Packs or powerbase in water. Do not use a power washer or high-pressure hose to clean a Segway PT. Avoid getting water into the charge port. Avoid exposing the Segway PT to heavy downpours or extended periods of heavy rain.
- As with all rechargeable batteries, do not charge near flammable materials.

## Compatibility

All i2 and x2 Segway PT models (that were shipped from the factory after October 12, 2006) are compatible with the Li-ion Battery Packs. Segway PT software version 14.0 or later is required for Li-ion Battery Packs. If you own a Segway PT model i180, XT, or GT, you already have version 14.0 software or higher and your Li-ion Battery Packs are “plug and play.” An upgrade to the Segway PT software is necessary in order to use Li-ion Battery Packs with older Segway PT models (Li-ion Battery Packs are not compatible with p Series models). To identify the software version on your i167, i170, i180, or e167 PT, first, power on, then power down while observing the display. If you see any of the images below, your Segway PT is compatible with Li-ion Battery Packs.



Software version 14.0



Software version 14.1



Software version 14.2

## Use the Same Battery Pack Types

Your Segway PT is powered by two Li-ion or two NiMH rechargeable Battery Packs. The p Series model can only use two 48-cell NiMH Battery Packs. The i Series model uses either two 60-cell NiMH or two Li-ion Battery Packs. The XT, GT, i2, and x2 models use two Li-ion Battery Packs. Do not mix Battery Pack types. Always use Battery Packs in pairs of the same chemistry, for example, two NiMH or two Li-ion Battery Packs.

## Replace Battery Packs in Pairs

Whenever you replace a Battery Pack, consider replacing both Battery Packs. Replacing only one Battery Pack will not necessarily increase the performance or range of your Segway PT, because the Segway PT is designed to operate only at the level allowed by the lower-energy Battery Pack. Redundancy is a critical safety feature built into the Segway PT. This applies to the Battery Packs. Therefore, you should replace Battery Packs in pairs (except in the unusual situation where a Battery Pack is replaced because of damage or defect and the other Battery Pack is relatively new).

## Lithium-ion Battery Pack Specifications

<b>Charging Time</b>	
before first use:	12 hours
recharge from empty	~8 hours
<b>Temperature Ranges</b>	
operating:	32° F – 122° F (0° – 50° C)
charging:	50° F – 122° F (10° – 50° C)
storage and transport:	-4° F – 122° F (-20° C – 50° C)
<b>General</b>	
capacity (Ah) and voltage:	5.2 Ah, 73.6 volts
dimensions:	14 x 7.5 x 3.2 in (35.7 x 19 x 8.2 cm)
battery pack weight (pair):	22.7 lbs (10.3 kg)

## Installation and Removal Instructions

### ⚠ WARNING!

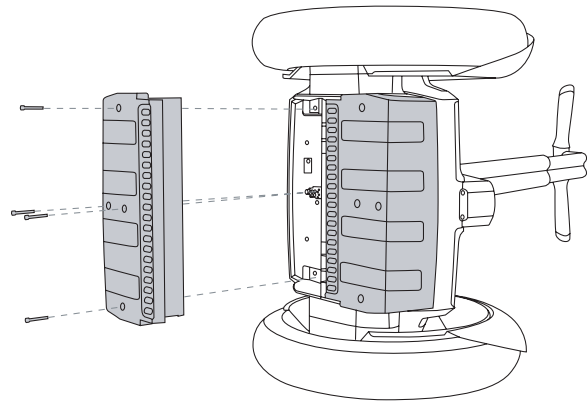
Unplug or disconnect your Segway PT from AC power before removing or installing Battery Packs or performing any service. It is hazardous to work on any part of your Segway PT when it is plugged into AC power. You risk serious bodily injury from electric shock as well as damage to your Segway PT.

Install and remove the Battery Packs in a dry location only.

### Remove Battery Packs

Tool Required: 3 mm hex wrench

1. Tip Segway PT onto its side so the outside of one of the wheels lays flat against a clean, smooth surface.
2. Use 3 mm hex wrench to remove fasteners (4 per Battery Pack).
3. Pull Battery Packs straight off chassis.



### Install Battery Packs

Tool Required: 3 mm hex wrench

1. Seat Battery Packs on chassis with curved edge facing outside of chassis.
2. Secure Battery Packs to chassis with fasteners (4 per Battery Pack) and tighten with 3 mm hex wrench. Torque fasteners to **1.6 N-m (14 in-lb)**.

*NOTICE:* Do not cross thread or over tighten fasteners. Tighten only to the prescribed torque. To avoid risk of damage, do not use a power tool to thread in or tighten fasteners. Use only Segway approved fasteners.

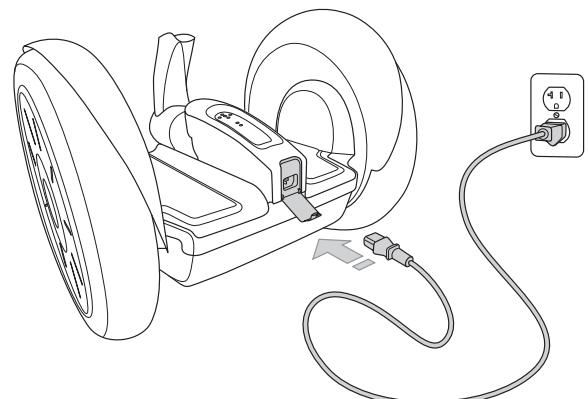
## Charging Your Battery Packs

In order to maintain the best performance from your Segway PT Battery Packs, fully charge your Battery Packs for at least 12 hours, once a month, or once every 12 hours of operation — whichever comes first. Make sure your Battery Packs are within the specified charging temperature range when charging. Even if you do not intend to immediately use your new Battery Packs, you should still charge them for at least 12 hours as soon as possible.

### ⚠ WARNING!

Be sure the Charge Port is dry before charging Battery Packs. Do not insert plug if Charge Port is wet.

1. Plug one end of the Power Cord (provided with your Segway PT) into the Charge Port.
2. Plug the other end of the Power Cord into a grounded AC outlet (100 V – 240 V; 50 Hz – 60 Hz). The Power Cord should be properly grounded.



## Charging Your Battery Packs (cont.)

Remember to charge the battery packs on your Segway PT whenever it is not in use. You do not need to worry about overcharging, so you should always plug your Segway PT into AC power when it is not in use. Even if you will not be using your Segway PT for an extended period of time, you should leave it plugged into AC power. Otherwise, the Battery Packs could fully discharge over time, causing them permanent damage. Do not store your Segway PT or Battery Packs for more than one month without fully charging the Battery Packs at least once every 30 days. This could cause permanent damage to the Battery Packs.

## Charge Indicators

The Segway PT has two LED (Light Emitting Diode) charging indicators. Please refer to the Reference Manual that came with your Segway PT to determine where the charge indicators are located for your particular model. The charging indicators provide independent information regarding whether each Battery Pack is charging.

When a green LED is on, the respective Battery Pack is receiving a pulse of current. Slow pulse rates are slow charging rates, faster rates denote faster charging, and solid green is the maximum charge rate.

## Charging Process

The table to the right describes the charging process. The length of each stage in the process, and the signals from the charging indicators, will vary based on the following:

- Amount of charge already stored in the Battery Pack: The lower the Battery Charge Level is, the longer it will take to complete the charging process.
- Battery Pack temperature: If the Battery Packs are too hot or too cold, they may not charge, may not progress through the charging stages, or may take much longer to charge. The Battery Packs will charge most efficiently when they are nearest the center of the recommended charging temperature range.

Stage	Indicators
Initial Test	Battery Pack immediately proceeds to "Fast Charge"
Fast Charge	Solid Green LEDs. The majority of charging takes place during this stage.
Cell Balancing/ Fully Charged	Green pulsing LEDs; the time between pulses gets longer as the cells come into balance.

## Charging Failures

If a failure is detected during charging, all charging will stop to that battery pack. Depending on the nature of the failure, a solid red charging indicator light will be displayed or the charging indicator will be off. (Keep in mind, the charging indicators will be unlit for approximately 5 minutes after the Cell Balancing stage.) If either or both charging indicators are off or red, do the following:

- If the charging indicators are off (no illumination), check to make sure that AC power is present.
- If AC power is present and the charging indicators are either red or off, unplug the power cord, then remove and reseat the Battery Packs.
- Make sure Battery Packs are within the specified temperature range.
- If these steps do not resolve the problem, contact an Authorized Segway Dealer. For a list of Dealers, visit [www.segway.com](http://www.segway.com).



## **Recalibrating the Battery Charge Level Display**

The Segway PT indicates the battery charge level in the Handlebar Display or InfoKey Controller (depending on which PT model you have). When using Li-ion Battery Packs the Display may be inaccurate after long periods of storage, or during initial use. To recalibrate the Display:

1. Fully charge the Battery Packs for 12 hours.
2. Discharge the Battery Packs until the bottom bar in the Display is blinking (approximately 10 percent Battery Pack charge remaining). To safely discharge to this level, you may leave your Segway PT powered on in Balance Mode, leaning against a wall. Make sure to do this in a safe, secure location.
3. Fully recharge the Battery Packs for a minimum of 10 hours, after which the Battery Charge Level Display will be recalibrated.

## **Transportation and Shipping**

Lithium-ion Battery Packs are regulated as "Hazardous Materials" by the U.S. Department of Transportation. For more information, contact the U.S. Department of Transportation at [www.phmsa.dot.gov/hazmat/regs](http://www.phmsa.dot.gov/hazmat/regs) or call 1-800-467-4922.

## **Proper Disposal**

NiMH and Li-ion Battery Packs used in the Segway PT can be recycled. Recycle or dispose of Battery Packs in accordance with local environmental regulations. Do not place in fire or incinerate. For more information, contact Segway at 1-866-4SEGWAY (1-866-473-4929), or visit our website at [www.segway.com](http://www.segway.com).